

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Luting Cements

Presented by

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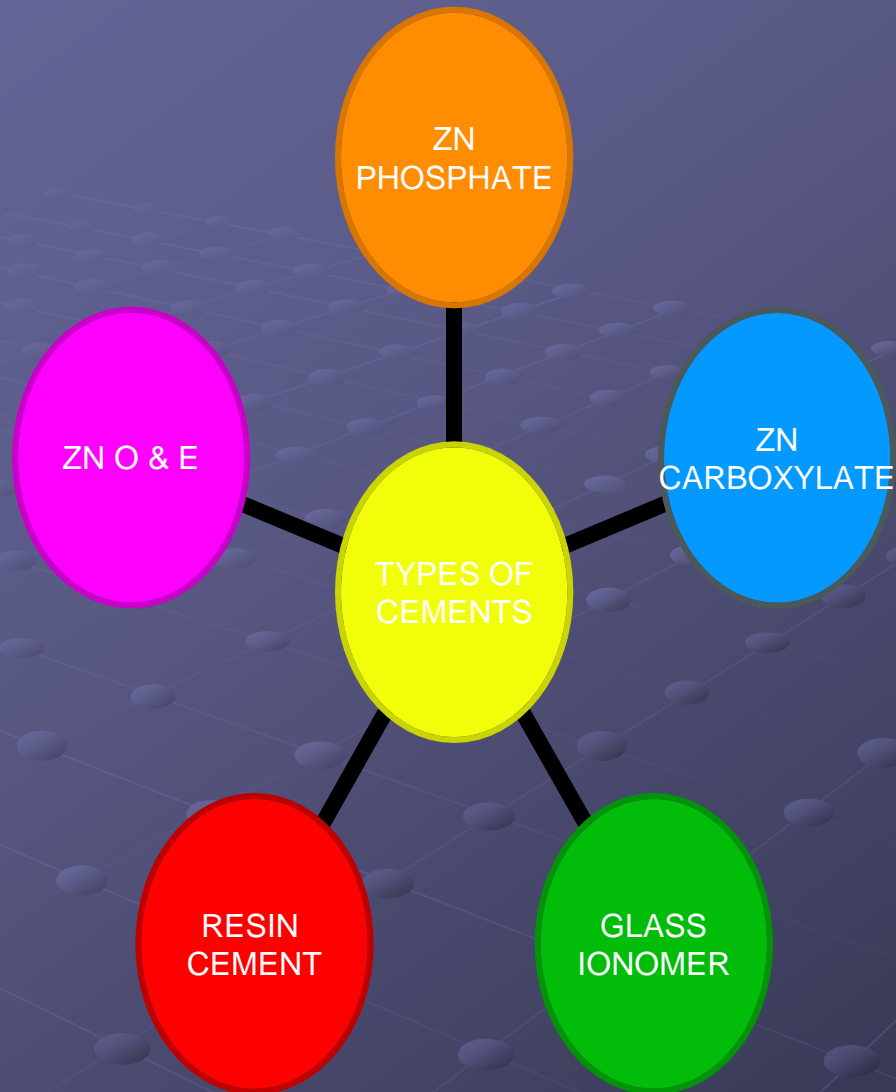
- The gap between the tooth and the restoration is filled with a luting cement.
- The mechanisms that hold a restoration on a prepared tooth structure can be divided into:
 - 1) non- adhesive mechanical bonding, between the small irregularities of the tooth and the fitting surface of the restoration.
 - 2) Micromechanical bonding, produced by etching (acids, electrolytic, sandblasting)
 - 3) Molecular bonding (ionic, covalent, Van der Waals)

Ideal Requirements of Cements

- Adhesive property. True adhesive cements are polycarboxylate, GI and adhesive resin cements.
- Biologically compatible, ZnO & E has palliative effect.
- High mechanical Properties, compressive, tensile and mod of Elasticity.
- Insolubility in oral fluids, all soluble except for resin cement.

- Suitable working time, important for cementing long span bridges. Can alter the setting time by changing: P/L ratio, rate of powder addition, temperature and spatulation time.
- Thin film thickness. Thin film gives better adhesion and retention. Acceptable thickness is 20-40 microns. Factors affecting thickness: L/P ration; viscosity; amount of seating pressure, escape of cement by correct taper, internal relief (electric stripping, chemical etching, die spacer). ZnOE has highest while resin cement the lowest film thickness.

- Low viscosity and high flow, GI has best initial flow.
- Translucency, important for non-metallic restorations. GI and resin cements are translucent.
- Anti-cariogenic effect, GI.
- Easy removal of excess as residual cement can cause tissue irritation and perio problems.
- THEREFORE THERE IS NO IDEAL CEMENT



Zn Phosphate

● Composition:

powder: 90% ZnO, 10% MgO

Liquid: Aq solution of phosphoric acid 30-40%

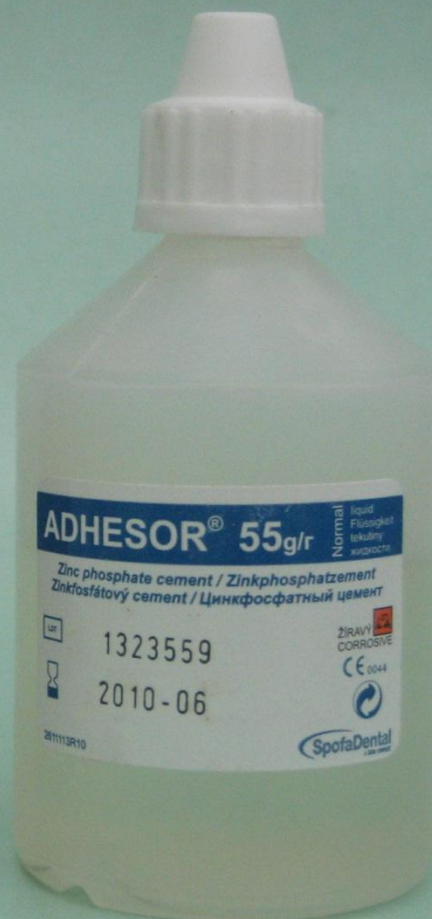
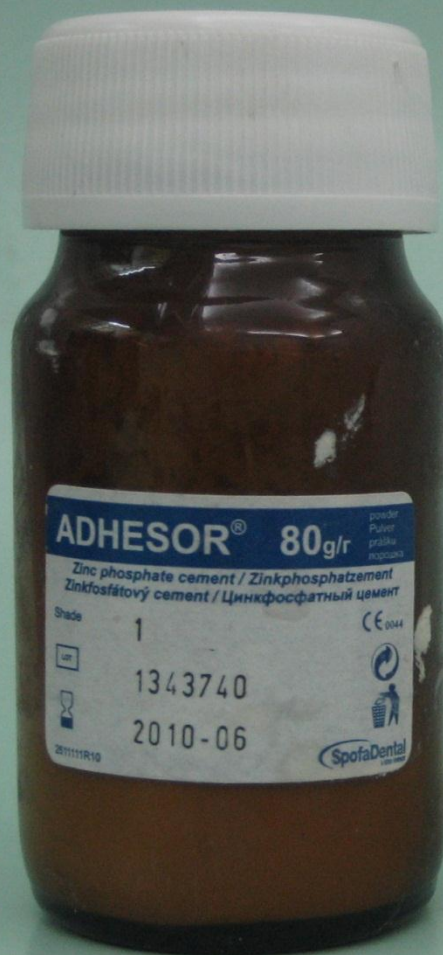
Properties:

Non-Adhesive, irritant to pulp (initial pH 2 which rises over 24 hrs to 5.5)

Good mechanical properties, soluble, thin film (20-25 μ) thickness, good flow but soluble.

Long setting time (good for long span bridges)

No anti-cariogenic property, not translucent, easy removal of excess.



● Manipulation:

- Powder divided into 6 equal parts...added to liquid....on a clean cold glass slab (dissipate heat from exothermic reaction)
- Proper mix when there is stringing for 2cm
- Adding powder to increase P/L ratio will: increase mech prop; decrease solubility and irritation.
- Should I use a varnish???

Zn Oxide & Eugenol

- Type I , Type II
- Type I powder is ZnO & liquid is Eugenol
- Used as temp cementation, has palliative effect, but shouldn't be used under acrylic temp crowns.

- Type II (reinforced) has hydrated resin in powder and ortho-ethoxy benzoic acid in liquid.
- Used as a permanent cement, especially in deep preps; moisture control is difficult, as setting is not affected by moisture.
- Soluble, short working time, 50μ, opaque, non-cariogenic, excess not removed easily.

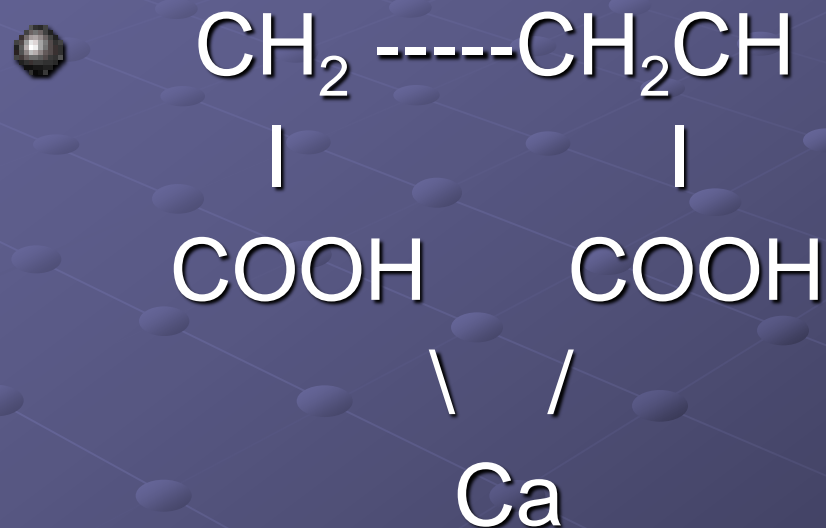


Zn Polycarboxylate Cement

- First true adhesive cement
- Powder: ZnO, 10%MgO
- Liquid: 40% aqueous Polyacrylic acid
- Manipulation: spatulation quickly, should be applied while glossy as there are free radical responsible for chemical bonding, otherwise poor bonding.



- Adhesion by active carboxyl group. Adheres to E better than D.
- Should clean (conditioning) of tooth surface with the liquid to remove smear layer.



- Cement bonds well to non precious metals but not to porcelain or gold (tin plating)
- Biocompatible (weak acid, quick rise to neutral, large mol. wt of acid)
- Weaker mech prop than Zn phosphate
- Short working time, soluble, thin film thickness 25μ , viscous (pseudo-plastic), opaque, non-cariogenic.
- Left to set completely, as removal in the rubbery stage can pull cement from under the crown causing voids.

Glass Ionomer Cement

- Powder: Ca fluoro alumina silicate
- Liquid : Polyacrylic or polymalic acids (+ other weak acids)
- Resin modified type has resin (HEMA or BISGMA)

Note: liquid can be acid or water

- Adhesive cement ($E > D$, Non-pr $>$ pr)
- Biocompatible (high acid at first giving sensitivity)
- Cement is soluble until it set so add varnish at finish lines for protection (resin more resistant)
- Good mech prop
- Long working time, thin film thickness, excellent flow, translucent (not used under all cerm), anticariogenic, easy removal of excess.



Different forms





Conventional GI for cementation

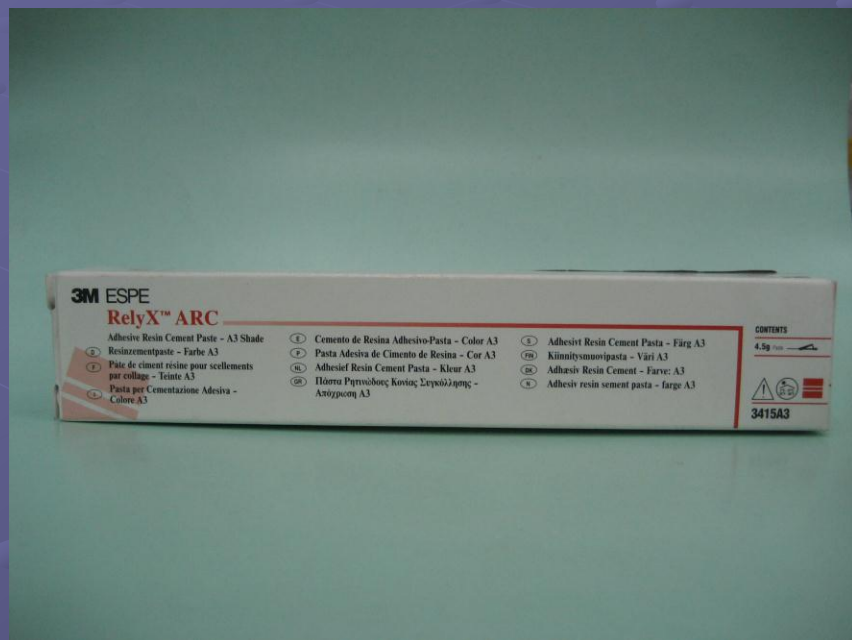
Adhesive Composite Resin

- Available in Chemical, light and dual cured forms.
- Adheres to E and D (remove smear layer)
- Bonds to non-pr metals (oxide layer), can increase bonding with sandblasting
- Bonds to porcelain only after treatment with hydroflouric etching and silanization
- Two basic adhering components:
 - 4 META
 - Panavia

Properties

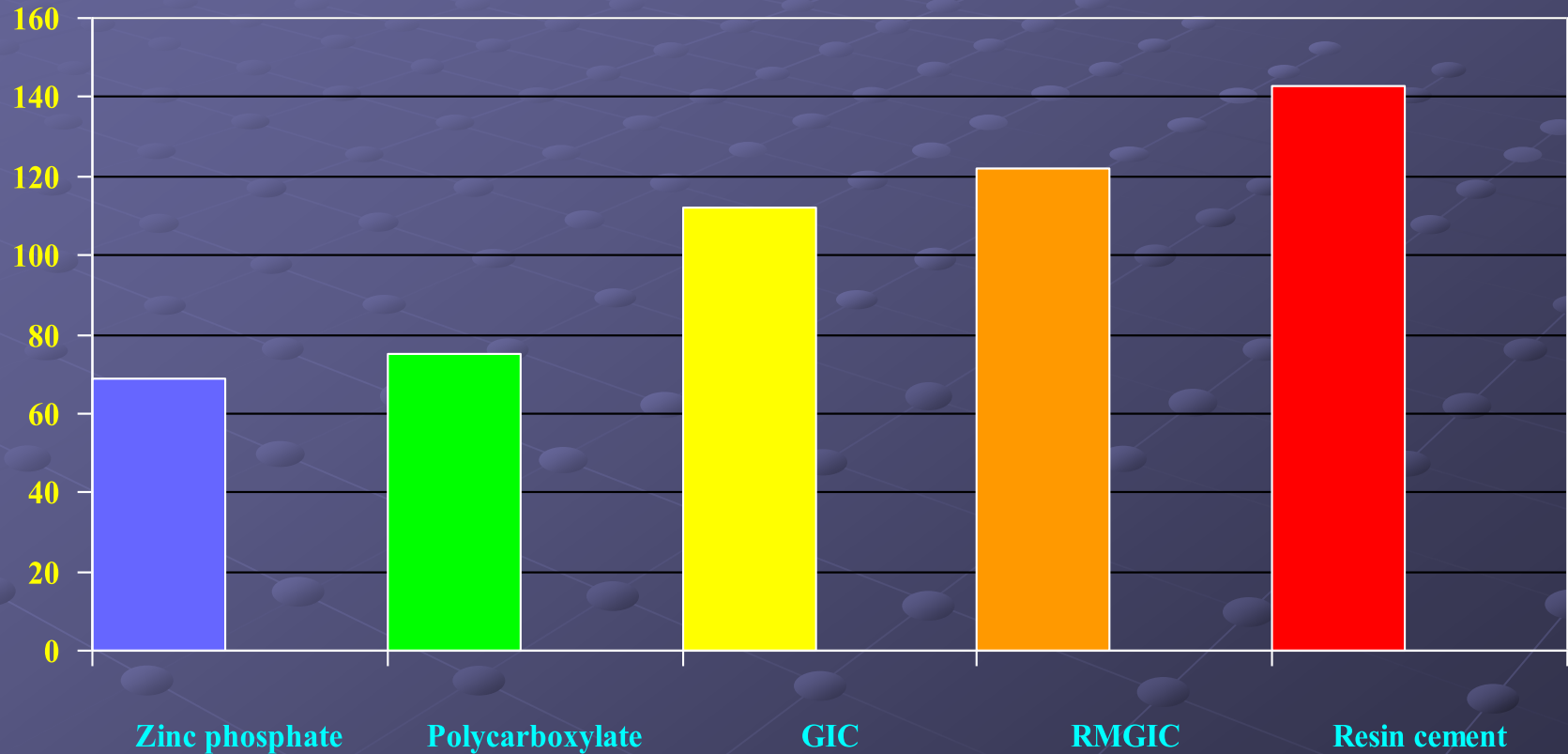
- Bio incompatible
- Excellent mech prop
- Insoluble, short working time, thin film thickness, non cariogenic
- Moderate flow (resin part), translucent
- Must remove excess before it hardens
- With panavia cement an anti-oxygen barrier is placed





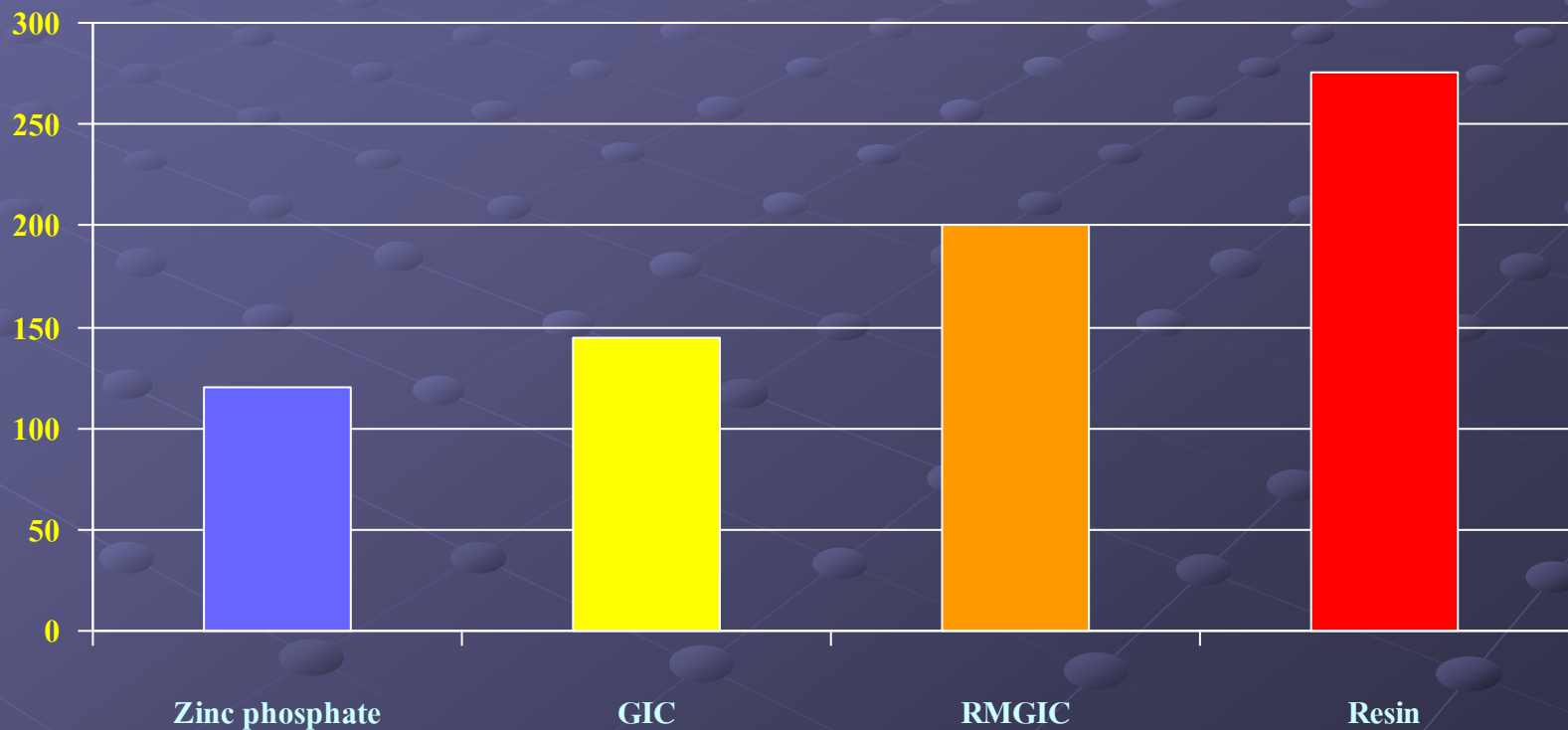
Comparable properties of cements

Compressive strength [MPa]

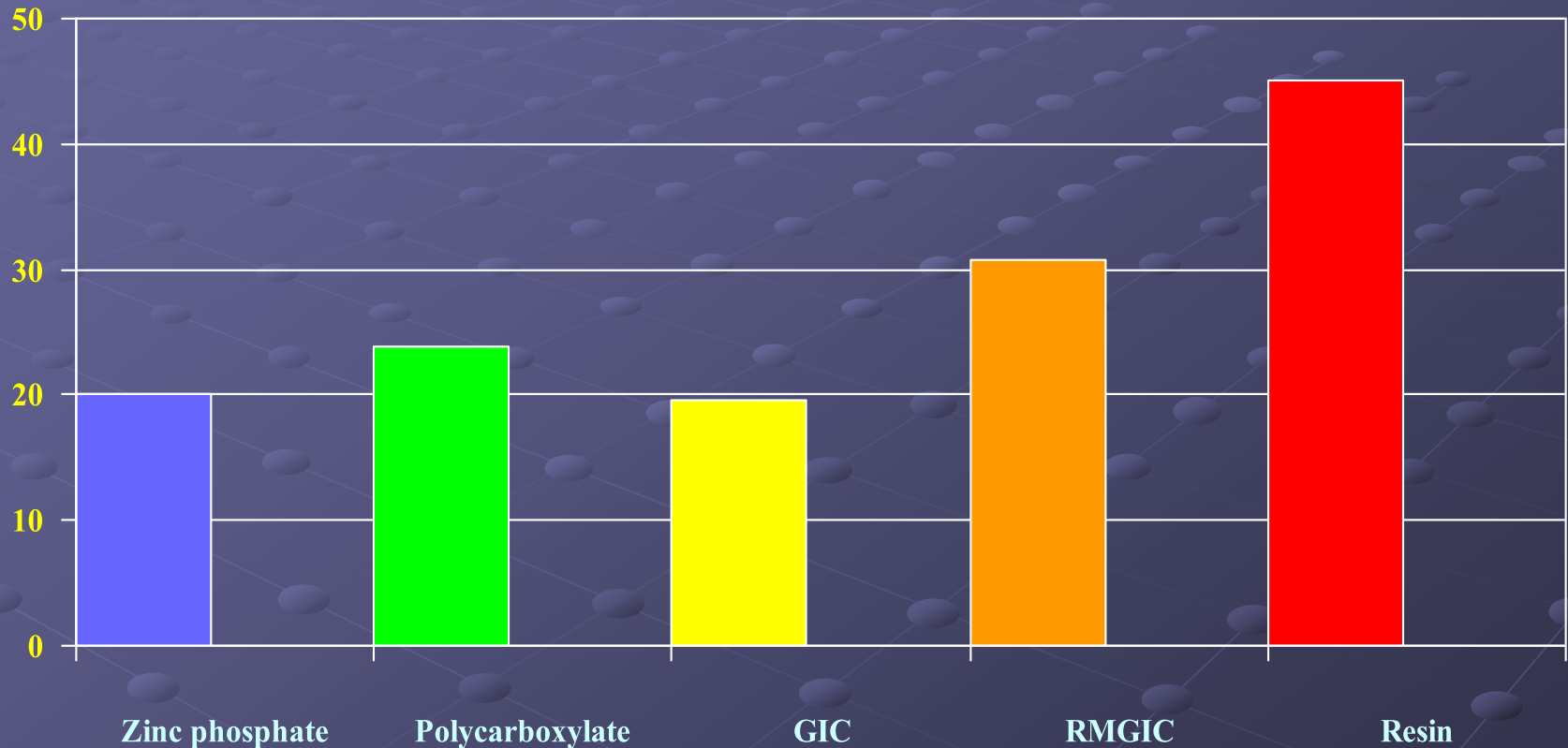


Bond strength

Separation forces [MPa]



Film thickness [μm]



Others

● Solubility

- ZOE > Polycarboxylate > Zinc phosphate~GIC > Resin cement

● Irritation to pulp tissues

- Resin~Zinc phosphate > GIC > Polycarboxylate > ZOE~Calcium hydroxide

Selection of Cement

- Long span bridge
- High caries index
- Deep preparations
- All ceramic
- Core structures (amalgam, comp, GI, metal, ceramic)
- Posts
- Poor retention (overtapering, short)
- Resin bonded bridges

The background of the slide is a dark blue gradient. Overlaid on this is a 3D grid of small, light blue spheres. The spheres are arranged in a perspective view, receding into the distance. They are connected by thin, light blue lines that form a grid pattern. The spheres have a slight shadow, giving them a three-dimensional appearance.

Thank you....